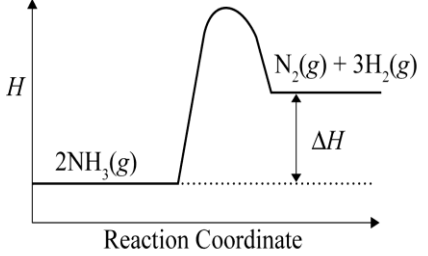


ANSWERS: Endothermic and Exothermic reactions

QUESTION: Classify the following reactions as endothermic or exothermic

Reactions	Endothermic or Exothermic reaction
When solid sodium hydroxide is added to water, the temperature increases.	EXOthermic
$\text{H}_2\text{O}(\ell) \rightarrow \text{H}_2\text{O}(s)$	EXOthermic
$\text{C}_6\text{H}_{12}\text{O}_6(s) + 6\text{O}_2(g) \rightarrow 6\text{CO}_2(g) + 6\text{H}_2\text{O}(\ell) \Delta_r H^\circ = -2\,820 \text{ kJ mol}^{-1}$	EXOthermic
ice \rightarrow water	ENDOthermic
$2\text{H}_2(g) + \text{O}_2(g) \rightarrow 2\text{H}_2\text{O}(g)$	EXOthermic
$\text{NH}_4\text{NO}_3(s) \rightarrow \text{NH}_4^+(aq) + \text{NO}_3^-(aq) \Delta_r H = +25.7 \text{ kJ mol}^{-1}$	ENDOthermic
water vapour condensing	EXOthermic
$\text{C}_2\text{H}_4(g) + \text{H}_2\text{O}(g) \rightarrow \text{C}_2\text{H}_5\text{OH}(g) \Delta_r H = -48.0 \text{ kJ mol}^{-1}$	EXOthermic
$\text{H}_2\text{O}(g) \rightarrow \text{H}_2\text{O}(\ell)$	EXOthermic
$\text{CH}_4(g) + \text{H}_2\text{O}(g) \rightarrow \text{CO}(g) + 3\text{H}_2(g)$ 206kJ of energy is absorbed	ENDOthermic
When zinc powder reacts with copper sulfate solution, the temperature rises.	EXOthermic
$\text{NaOH}(aq) + \text{HCl}(aq) \rightarrow \text{NaCl}(aq) + \text{H}_2\text{O}$ A temperature increase occurs.	EXOthermic
$\text{N}_2(g) + 2\text{N}(g) \Delta_r H = +934 \text{ kJ mol}^{-1}$	ENDOthermic
$\text{H}_2(g) + \text{I}_2(g) \rightleftharpoons 2\text{HI}(g)$ A temperature decrease occurs.	ENDOthermic
$2\text{H}_2(g) + \text{CO}(g) \rightleftharpoons \text{CH}_3\text{OH}(g) \Delta_r H = -128 \text{ kJ mol}^{-1}$	EXOthermic
$\text{C}(s) + \text{O}_2(g) \rightarrow \text{CO}_2(g) \Delta_r H = -393 \text{ kJ mol}^{-1}$	EXOthermic
Formation of snow from water vapour.	EXOthermic

	ENDOthermic
When magnesium is added to hydrochloric acid a reaction occurs and the temperature of the reaction mixture increases.	EXOthermic
$\text{H}_2(\text{g}) + \frac{1}{2}\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{g}) \quad \Delta_r H = -286 \text{ kJ mol}^{-1}$	EXOthermic
Photosynthesis – food-making process in plants	ENDOthermic
Freezing of water	EXOthermic
Dissolving sodium hydroxide in water (the temperature increases)	EXOthermic